1. Nov/2019/Paper_41/No.10

(a) Describe the features of ATP that make it suitable for its role as the universal energy currency of cells. [6]

(b) Describe how you would carry out an investigation on the effect of temperature on the rate of respiration of yeast in anaerobic conditions using a redox indicator, such as methylene blue. [9]

[Total: 15]

2. Nov/2019/Paper_42/No.8

The passage below outlines the process of oxidative phosphorylation in mitochondria.

Complete the passage by using the most appropriate scientific terms.

Reduced ..... releases hydrogen atoms to cytochrome carriers.

Hydrogen atoms split into protons and electrons and the electrons are passed from carrier to carrier. Energy from electron transfer is used to pump protons into the

..... , so that a proton gradient is set up across the

..... .

Protons ..... through the channel protein known as

..... , into the matrix, producing ATP. The protons combine with electrons and ..... atoms to form water.

[Total: 6]

3. Nov/2019/Paper_42/No.10

(a) Describe the features of ATP that make it suitable for its role as the universal energy currency of cells. [6]

(b) Describe how you would carry out an investigation on the effect of temperature on the rate of respiration of yeast in anaerobic conditions using a redox indicator, such as methylene blue. [9]

[Total: 15]

4. Nov/2019/Paper_43/No.8

The passage below outlines the structure of the mitochondrion.

Complete the passage by using the most appropriate scientific term(s).

The mitochondrion is found in eukaryotic cells. It is bound by a double membrane.

The outer membrane is permeable to pyruvate, which is the main product of

..... .

The inner membrane is folded to form ..... ,

which increase the surface area of the membrane. Embedded in the inner membrane are the carrier proteins of the electron transport chain and the protein complex responsible for ATP production, known as ..... .

Electron flow leads to the build-up of a large concentration of ..... in the intermembrane space due to the activity of the electron transport chain. The ..... of the mitochondrion, which contains enzymes, is the site of the link reaction and the ..... .

[6]

5. Nov/2019/Paper_43/No.7(a, b)

(a) Gibberellin is involved in the germination of barley seeds.

In an investigation, aleurone layers from barley seeds were extracted. One sample was treated with gibberellin and the other sample was given no gibberellin treatment. The rate of production of amylase enzyme by the aleurone layers was measured over 15 hours.

The results are shown in Fig. 7.1.

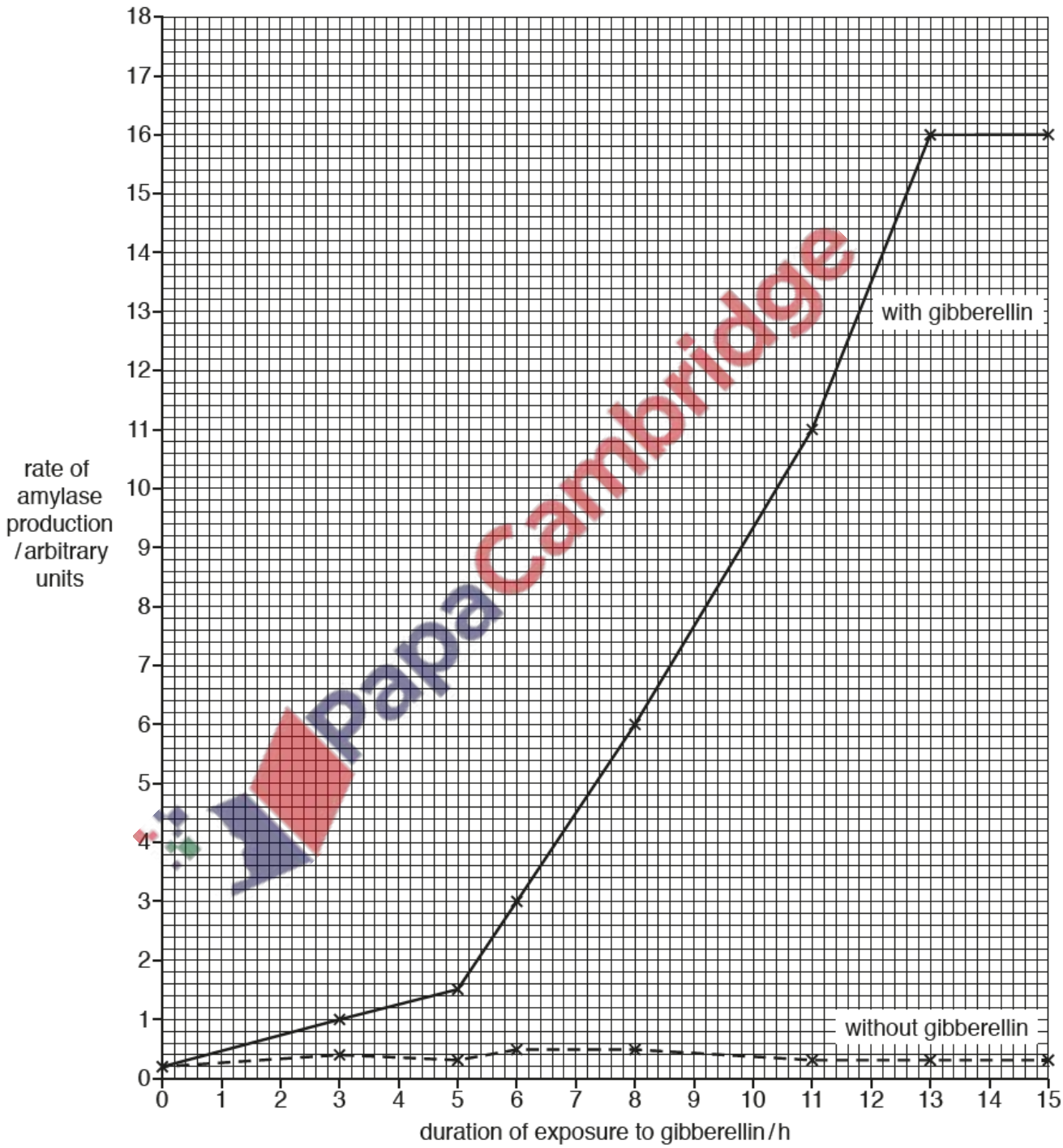

Fig. 7.1

Describe the results shown in Fig. 7.1.

.....

.....

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.....

.....

..... [3]

(b) Explain why the aleurone layers of barley seeds need to produce amylase during germination.

.....

.....

.....

.....

.....

..... [3]

6. June/2019/Paper_41/No.4

(a) The link reaction and Krebs cycle take place in the mitochondrion.

The main stages of the link reaction and Krebs cycle are listed in Table 4.1.

They are **not** listed in the correct order.

Table 4.1

stage	description of stage
A	acetyl group combines with coenzyme A to form acetyl CoA
B	citrate is formed
C	hydrogen atoms are accepted by NAD and FAD
D	oxaloacetate is regenerated
E	pyruvate enters the mitochondrial matrix
F	acetyl group is formed
G	acetyl CoA enters Krebs cycle
H	ATP is made by substrate-linked phosphorylation
I	pyruvate is decarboxylated and dehydrogenated
J	acetyl CoA combines with oxaloacetate
K	citrate is decarboxylated and dehydrogenated

Complete Table 4.2 to show the correct order of the stages.

Three of the stages have been done for you.

Table 4.2

correct order	letter of stage
1	**E**
2	.....
3	.....
4	.....
5	.....
6	**J**
7	.....
8	.....
9	.....
10	.....
11	**D**

[4]

(b) Outline the role of NAD in respiration in aerobic conditions.

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Carbon dioxide is removed from compounds in the link reaction and Krebs cycle by decarboxylation.

(i) State the total number of molecules of carbon dioxide removed in the link reaction and Krebs cycle for each molecule of glucose respired.

..... [1]

(ii) In a mammal, carbon dioxide diffuses from cells into the blood to be transported to the lungs.

Suggest why carbon dioxide is transported in the blood mainly as hydrogen carbonate ions and not as carbonic acid.

..... [1]

[Total: 10]

7. June/2019/Paper_42/No.8

(a) Oxidative phosphorylation takes place in the mitochondrion.

Table 8.1 shows the different stages of oxidative phosphorylation.

The stages are **not** listed in the correct order.

Table 8.1

stage	description of stage
Q	protons diffuse through the membrane proteins into the matrix
R	a proton gradient is set up across the crista membrane
S	hydrogen atoms split into protons and electrons
T	protons combine with electrons and oxygen atoms to form water
U	electrons are passed from carrier to carrier
V	reduced NAD releases hydrogen atoms to cytochrome carriers
W	energy from electron transfer is used to pump protons into the intermembrane space
X	ATP synthase produces ATP

Complete Table 8.2 to show the correct order of the stages.

Two of the stages have been completed for you.

Table 8.2

correct order	letter of stage
1	**V**
2	.....
3	.....
4	.....
5	**R**
6	.....
7	.....
8	.....

[4]

(b) State the precise location in a mitochondrion of each of the following.

ATP synthase .....

Krebs cycle .....

electron transport chain .....

coenzyme A .....

pyruvate .....

[5]

[Total: 9]

8. June/2019/Paper_42/No.9(a)

(a) Describe how you would carry out an investigation into the effect of temperature on the rate of photosynthesis of an aquatic plant. [8]

9. June/2019/Paper_43/No.8

(a) Table 8.1 shows some of the stages of glycolysis and respiration in anaerobic conditions in yeast.

The stages are **not** listed in the correct order.

Table 8.1

stage	description of stage
A	triose phosphate is dehydrogenated by NAD
B	pyruvate is decarboxylated
C	ethanal is formed
D	ethanol is formed
E	glucose is phosphorylated by ATP
F	pyruvate is formed
G	ethanal is reduced by alcohol dehydrogenase
H	fructose bisphosphate is formed
I	ATP is made by substrate-linked phosphorylation

Complete Table 8.2 to show the correct order of the stages.

One stage has been completed for you.

Table 8.2

correct order	letter of stage
1	.....
2	.....
3	.....
4	.....
5	**F**
6	.....
7	.....
8	.....
9	.....

[4]

(b) Yeast respires glucose in aerobic and anaerobic conditions.

Explain why less ATP is produced when yeast respires in anaerobic conditions compared to when yeast respires in aerobic conditions.

.....

.....

.....

.....

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.....

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.....

.....

..... [5]

[Total: 9]

10. June/2019/Paper_43/No.10

(a) Describe how ATP is synthesised by oxidative phosphorylation. [8]

(b) Describe how you would carry out an investigation, using a simple respirometer, to measure the effect of temperature on the respiration rate of insect larvae. [7]

[Total: 15]

11. Feb/2019/Paper_42/No.7

(a) Isolated mitochondria were used to investigate respiration.

- Mitochondria were extracted from respiring mammalian cells and incubated in a buffer solution.
- Pyruvate and inorganic phosphate (Pi) were added at time zero.
- ADP was added one minute later.
- The oxygen concentration of the buffer solution containing mitochondria was monitored throughout the investigation.

The results of the investigation are shown in Fig. 7.1.

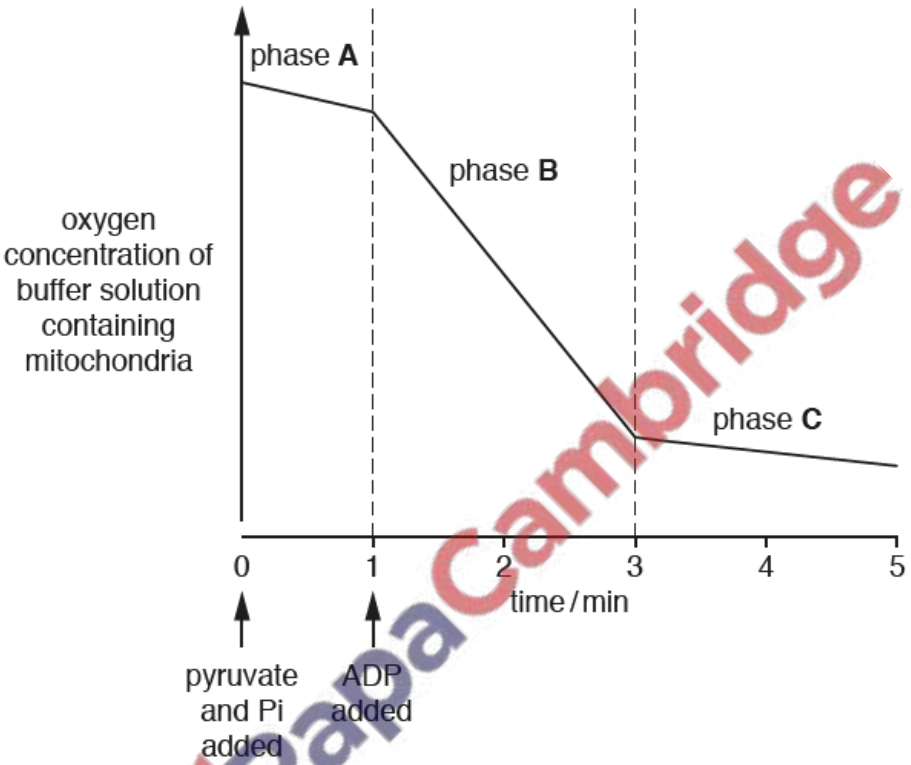

Fig. 7.1

(i) Suggest why the line of the graph in Fig. 7.1 is steeper during phase **B** than during phase **A**.

.....

.....

.....

.....

.....

..... [3]

(ii) Suggest why the line of the graph starts to level out in phase **C**.

.....

..... [1]

(b) Some plants, such as rice, grow with their roots submerged in water.

Fig. 7.2 shows a group of rice plants.

Fig. 7.2

Explain how rice is adapted to grow with its roots submerged in water.

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..... [5]